Customer No.: 31561
Application No.: 10/604,795
Docket No.: 9722-US-PA

In The Claims

1. (original) An under-ball-metallurgy layer between a bonding pad on a chip and a solder bump, wherein material of the solder bump includes tin, the under-ball-metallurgy layer at least comprising:

an adhesion layer over the bonding pad;

a nickel-vanadium layer over the adhesion layer;

a wettable layer over the nickel-vanadium layer; and

a barrier layer over the wettable layer.

2. (original) The under-ball-metallurgy layer of claim 1, wherein the barrier layer includes a material selected from the group consisting of nickel, iron and cobalt.

3. (original) The under-ball-metallurgy layer of claim 1, wherein the adhesion layer includes one selected from the group consisting of titanium, tungsten, titanium-tungsten alloy and chromium.

4. (original) The under-ball-metallurgy layer of claim 1, wherein the wettable layer includes one selected from the group consisting of copper, nickel, iron and cobalt.

5. (original) The under-ball-metallurgy layer of claim 1, wherein the adhesion layer includes a sputtering adhesion layer

6. (original) The under-ball-metallurgy layer of claim 1, wherein the nickel-vanadium layer includes a sputtering nickel-vanadium layer.

7. (original) The under-ball-metallurgy layer of claim 1, wherein the wettable layer is

formed by sputtering, electroplating or electroless plating.

8. (original) The under-ball-metallurgy layer of claim 1, wherein the barrier layer includes an electroplating barrier layer.

9. (original) The under-ball-metallurgy layer of claim 1, wherein the under-ball-metallurgy layer further includes a second wettable layer made of copper or copper alloy over the barrier layer.

10. (original) An under-ball-metallurgy layer between a bonding pad on a chip and a solder bump, wherein material of the solder bump includes tin, the under-ball-metallurgy layer at least comprising:

an adhesion layer over the bonding pad;

a nickel-vanadium layer over the adhesion layer;

a wettable layer over the nickel-vanadium layer; and

a barrier layer over the wettable layer, wherein the barrier layer is a barrier preventing the penetration of nickel atoms from the nickel-vanadium layer.

11. (original) The under-ball-metallurgy layer of claim 10, wherein the barrier layer includes one selected from the group consisting of nickel, iron and cobalt.

12. (original) The under-ball-metallurgy layer of claim 10, wherein the adhesion layer includes one selected from the group consisting of titanium, tungsten, titanium-tungsten alloy and chromium.

13. (original) The under-ball-metallurgy layer of claim 10, wherein the wettable layer includes one selected from the group consisting of copper, nickel, iron and cobalt.

14. (original) The under-ball-metallurgy layer of claim 10, wherein the under-ball-metallurgy layer may further include a second wettable layer made of copper or copper alloy over the barrier layer.

15. (currently amended) An under-ball-metallurgy layer between a bonding pad on a chip and a solder bump, wherein material of the solder bump includes tin, the under-ball-metallurgy layer at least comprising:

an adhesion layer over the bonding pad **with a portion being direct contact**;

a wettable layer over the adhesion layer; and

a nickel-vanadium layer over the wettable layer.

16. (original) The under-ball-metallurgy layer of claim 15, wherein the adhesion layer includes one selected from the group consisting of titanium, tungsten, titanium-tungsten alloy and chromium.

17. (original) The under-ball-metallurgy layer of claim 15, wherein the nickel-vanadium layer includes a sputtering nickel-vanadium layer.

18. (original) The under-ball-metallurgy layer of claim 15, wherein the wettable layer includes one selected from the group consisting of copper, nickel, iron and cobalt.

19. **(cancelled)**

20. (original) The under-ball-metallurgy layer of claim 15, wherein the under-ball-metallurgy layer may further include a second wettable layer made of copper or copper alloy over the nickel-vanadium layer.